Lower Passaic River Porewater Generation Procedure Detail

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Porewater, or Interstitial water, will be generated from 2 foot core sections provided to CH2M Hill's Applied Sciences Laboratory that will be sent off for analysis of polychlorinated dibenzodioxins / polychlorinated dibenzofurans (PCDD/PCDF), polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), total organic carbon (TOC), and dissolved organic carbon (DOC) following CH2M Hill ASL SOP SVO50 (*Standard Operating Procedure for the Ex-Situ Extraction of Interstitial Water from Sediment Samples*). Porewater for analysis of mercury species will be prepared at the laboratory performing this analysis (Brooks Rand Labs).

The porewater will be generated by centrifugation of the homogenized core samples. The resulting porewater will be stored in the laboratory cooler unit and will undergo visual inspection and turbidity testing before a 72 hour gravity settling period. Once the gravity settling period is complete the bulk porewater sample will then be sub-sampled for individual analytical fractions and those containers shipped to the appropriate laboratories for further analysis.

Porewater Generation Procedure Details

The following describes details specific to the porewater generation for the Lower Passaic core samples and may represent changes for the standard laboratory SOP.

Sample Preparation

Each sample, consisting of multiple cores, will be processed in a single batch to negate any cross-contamination of samples.

All tools utilized during sample processing will be precleaned, solvent, and ASTM Type I water rinsed prior to use and between samples.

Each core sample will be opened over a precleaned tray to capture any free water released as the core section is removed from the core sleeve. Large artifacts will be manually removed and documented.

The samples will be homogenized by placing each core into a precleaned stainless steel bowl and mixing the sample with a precleaned stainless steel spatula or similar tools. The homogenized samples will be partitioned into 500mL centrifuge bottles.

Centrifugation

Once the centrifuge bottles have been filled with sediment and balanced they will be placed into the Sorvall Instruments RC-3B Refrigerated Centrifuge.

The centrifuge will be programmed to maintain an internal temperature of 4 °C during the time that porewater is being generated.

Each set of centrifuge bottles containing sediment samples will be centrifuged at a target speed of 5000 rpms (but not lower than 3000 rpms).

Specific Operating Parameters. The specific operating parameters for each sample will be determined by the initial set of bottles centrifuged. This first set of bottles will be centrifuged for a total time of 15 minutes. The speed achieved for this initial set will be the target speed for all subsequent centrifuging with an allowance of 10% deviation in speed between sets of bottles.

At the end of the first 15 minute centrifuge period the overlying water will be decanted and measured using a pre-cleaned graduated cylinder. These vessels will be placed back into the centrifuge and processed for an additional 15 minutes. The resulting overlying water will be decanted and measured using a pre-cleaned graduated cylinder. If the volume of water from the second period of centrifuging is less that 10% of the volume from the first period, 15 minutes will be set as the duration for all future centrifuging of that sample. If it exceeds 10% the process will be repeated until an appropriate duration is determined.

Once the speed and duration have been set from the measurements of the first set of centrifuge bottles these parameters will be used for all future sample processing.

Settling Period

The bulk composite pore water sample will be stored in a sterile and sealed laboratory container for a period of 72 hours. Just prior to this period the sample will undergo a 'pre-settling' period visual inspection for the presence of suspended particles and/or colloids as well as a turbidity test. The sample will be stored in the laboratory's sample cooler at 0-6°C with internal custody seal affixed to the lid of the container.

After 72 hours the samples will be visually inspected for the presence of suspended particles and/or colloids. Additionally, a turbidity measurement will be conducted to derive a post settling period NTU value for the sample media. The bulk sample will be sub-divided at that time into specific approved laboratory containers and shipped overnight to the program laboratories for further analysis.

All resulting observations and analytical data will be recorded in the laboratory's sample logbook.

Prioritization of Analytical Fractions

The number of cores to be processed for pore water extraction was estimated based on a target production volume adequate to prepare two pore water composite samples. Each pore water composite sample will be analyzed for the following organic constituents:

1. PCDDs/PCDFs using EPA Method 1613B
2. PCBs (homologs and congeners) using EPA Method 1668A
3. PAHs and Alkyl PAHs using a laboratory-specific SOP based on California EPA Air Resources Board Method 429 and NOAA ORCA 130 Method
4. DOC using SW846-9060
5. TOC using SW846-9060

In the event that lower than estimated pore water volume is generated for a given pore water composite, the analytical fractions will be prioritized as presented above. For example, bottles will first be filled for PCDDs/PCDFs, followed by PCBs, then PAHs, etc.

If excess pore water is generated, duplicate samples will be prepared and sent for analysis following the same prioritization as the primary samples.

Packaging, Shipping, and Documentation

Pore water samples will be transferred into containers supplied by the project's contracted commercial laboratories. Details including sample size, sample collection bottles, preservative requirements, and holding times are provided in Worksheet #19 of both the 2011 River Mile 10.9 Characterization Quality Assurance Project Plan (QAPP) and Addendum D (CH2M HILL, 2013) of this QAPP. ASL will ship the samples under proper chain-of-custody to the contract laboratories for analysis.

Figure 1. Flow Diagram